9 Social amplification, social representations and identity processes

Chapter preview

This chapter introduces a systematic way to conceptualise how risk events, through social and psychological processes, can be amplified, or indeed dampened, and as a result can lead to a ripple of different consequences at various levels (for instance, economic, legal, cultural). This conceptual approach is known as the Social Amplification of Risk Framework (SARF). The basic tenets of SARF are described and the ways in which it has been used are summarised. Some of the recent elaborations of the approach are presented. The layering method is outlined as a tool for exploring amplification processes and ripple effects. The significance of hazard sequences, templates and negotiations with amplification and ripple processes are outlined, using the 2008 financial crisis to illustrate the complexity of such processes. The chapter then proceeds to consider two theories that serve to explain some of the processes that underpin the amplification or attenuation of risk: Social Representations Theory and Identity Process Theory. Both theories are presented briefly and their usefulness in predicting risk perceptions and judgements and the ripple effects of risk events is suggested.

1 The Social Amplification of Risk Framework

The Social Amplification of Risk Framework (SARF) describes both the social and individual factors that act to amplify or attenuate perceptions of risk and then generate secondary effects such as regulatory changes, economic losses or stigmatisation of technologies. The SARF was first proposed in 1988 by Roger Kasperson, Ortwin Renn, Paul Slovic, Halina Brown, Jacques Emel, Robert Goble, Jeanne Kasperson and Samuel Ratick and has been subsequently elaborated (Kasperson et al., 1988; Renn, 1991; Kasperson, 1992; Burns et al., 1993; Kasperson and Kasperson, 1996; Kasperson et al., 2003). The idea arose, according to Kasperson et al. (2003: 13), 'out of an attempt to overcome the fragmented nature of risk perception and risk communication research by developing an integrative theoretical framework capable of accounting for findings from a wide range of studies', including those from the psychometric and cultural schools of risk research and those from the media and organisational dynamics research traditions. Rosa (2003) argues that SARF is the most comprehensive tool available for the study of risk.

The framework particularly focuses upon the dynamic social processes that underlie risk perception and decisions. It highlights that certain events or hazards, which experts would state are relatively low in risk, can nevertheless become a focus of societal concern (risk amplification), whereas other hazards, which experts judge as more serious, attract less public attention (risk attenuation). In the UK, an example of amplification would be the response to the MMR vaccination (described in Chapter 6). An example of attenuation would be the reaction to naturally occurring sources of radiation, such as radon gas – which is much less than might be predicted on the basis of the scientific estimates of health risks. It is worth emphasising that the SARF is about attenuation as well as amplification, because this is sometimes ignored.

The SARF proposes that risks (or risk events, which can be either real or hypothesised) will have an impact not only through their primary physical effects but also, and often more importantly, through the way people communicate them to others. The act of communication requires that the risk is translated into various 'risk signals' (images, symbols and signs) that will interact with a variety of psychological, social, institutional or cultural processes and this will result in the intensification or dampening of the perceptions of the risk and its manageability.

See Figure 9.1 for a summary of the factors SARF proposes are at play. The use of terms like 'social stations' in the figure occurs because the originators were using the metaphor of amplification from classical communications theory applied to physical systems. The notion of a 'station' implies that reshaping (e.g. filtering, re-emphasis, elaboration, glossing and so on) of information is involved as it moves through that node ('station') in the system. This can be seen to fit with all that we have said in earlier chapters about the cognitive and affective biases that operate at the individual level in the interpretation of risk. It also fits with what is known about the way groups and organisations behave when dealing with risk (see Chapter 8).

While the framework does not emphasise particularly the way individuals, through their interactions, can amplify or attenuate a risk, they certainly can and much of the way institutions reshape risk reactions is mediated through interpersonal processes. Binder et al. (2011) illustrate how interpersonal discussion influences risk perceptions. They found that residents' perceptions of the risks associated with the siting of a new biological research facility in their community were significantly affected by the frequency and content of interpersonal discussions, even when other influence factors (like media coverage) were controlled.

Figure 9.1 actually makes it clear that the risk, or risk event, is given meaning through a complex and iterative process of interactions between different actors in the social structure. The meaning it is given will then determine the secondary, tertiary and subsequent effects that the risk can have upon different social entities (e.g. a local community or a company). It will also constrain the nature of the actions taken in response (e.g. legislative, organisational and economic).

The 'ripple effects' can spread far beyond the originating risk event. This diffusion of impact indicates that there are many potential 'stations' that can contribute to the amplification or attenuation process. This suggests that the risk

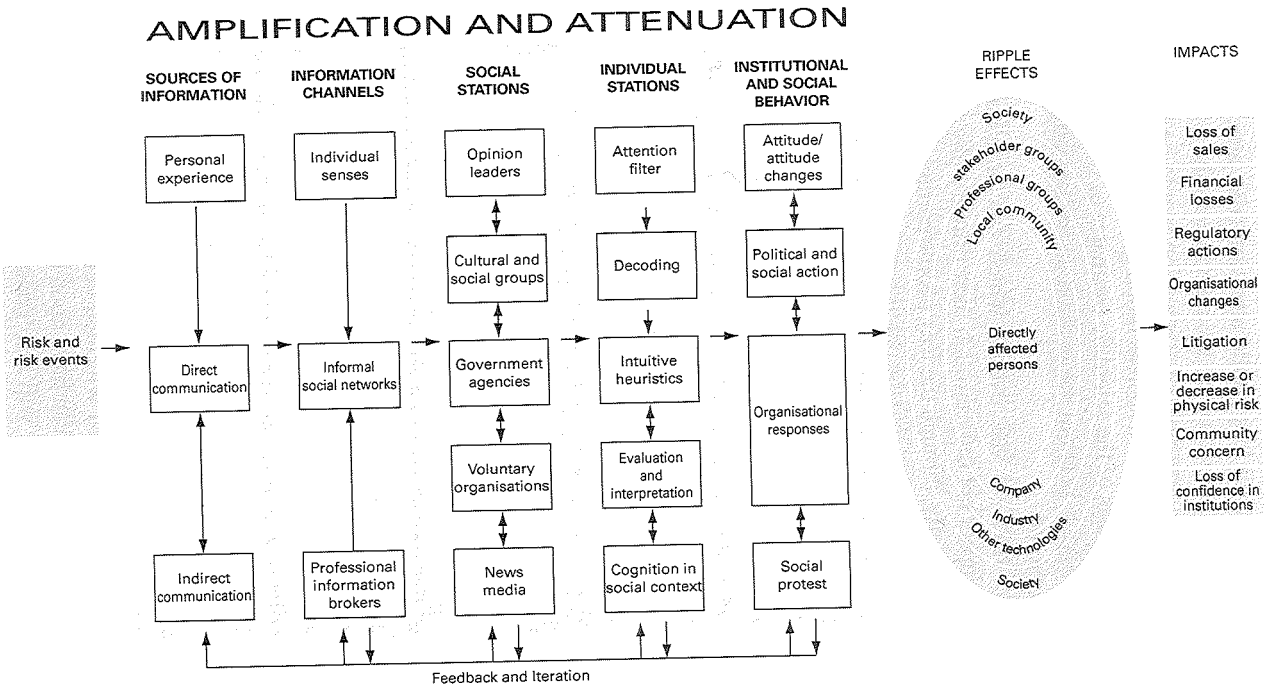

Figure 9.1 *The social amplification of risk framework*
Source: Pidgeon et al., 2003: 14.

event will have no ultimate or consolidated interpretation. It will change over time as each element in the ripple system is brought into play. For some risks, the timescale for interpretation and reinterpretation may be very extended (i.e. over centuries). It is therefore possible that delayed or intermittent reinterpretation will stimulate different cycles of impact and will change the targets impacted.

It is worth noting that this figure, from the Kasperson et al. (2003) publication, is more explicit than earlier (e.g. 1988) models in detailing the iterative nature of the interactions between sources of information, the information channels, 'social stations', 'individual stations' and institutional and social behaviour. This is worth emphasising because it indicates that this is an evolving framework. The development is pushing the framework into the assimilation of different dimensions of the context in which risk reactions grow. For instance, Masuda and Garvin (2006) argued that risk communication occurs in relation to situated experiences of place that are based on often conflicting world-views. This suggests that the ideologies that reside in the broad-based community that is interacting to construct the representation of the risk will be important in the framework. This links to what is described later with regard to social representations of risk.

Box 9.1 uses the 10 August 2006 public announcement of a terrorist plot to blow up several passenger airliners over the Atlantic to illustrate in real time how a SARF analysis might work. It can be seen that SARF is a very useful way to organise the analysis of a complex event and its aftermath.

Box 9.1 Eleven days in August 2006: terrorist plot to bomb aircraft

A brief summary of the events

At 11 p.m. on **9 August**, the Home Secretary, responsible for home land security, was alerted to the possibility that the biggest terrorist attack of modern times was imminent, that the plot must be dismantled and that arrests would soon be under way. Britain was to be put on maximum alert.

On **10 August 2006**, the British police announced that twenty-four terrorist suspects were being questioned about an alleged plot to detonate suicide bombs on board five airliners bound for the United States. They claimed terrorists planned to conceal high-explosive bombs in false bottoms built into energy drink bottles, using explosives similar to that used in the 7 July 2005 attacks in the London Underground. A detonator would have been hidden in the flash mechanism of a disposable camera. The arrests followed an anti-terrorist operation that had been running for months. One of the suspects was released within twenty-four hours – said to be an innocent bystander in one of the raids. A martyrdom video apparently recorded by someone planning to become a suicide bomber was found at one of the addresses raided by the police. A further seventeen people were arrested in Pakistan.

The very act of foiling the attack brought chaos to airports in the UK, with a knock-on effect around the world. Hundreds of flights were cancelled or delayed and passengers bedded down on terminal floors with no idea as to when they might take off.

Media on **11 August** carried the story and its consequences:

Twenty-four terrorist suspects were detained. Counter-terrorist agencies had monitored the plotters for twelve months and had moved in after intelligence that the execution was imminent.

Box 9.1 (cont.)

Co-ordinated arrests were made in Pakistan. The government's emergency planning committee (Cobra) was told that the first wave of bombings would have targeted five aircraft leaving the UK in the next few days. A second wave of bombings was also planned, with greater numbers involved. The aim of the bombers, according to intercepted Internet traffic, was to cause maximum death and destruction. The deputy commissioner for the London Metropolitan Police said that the aim of the terrorists was to commit 'mass murder on an unimaginable scale' and cause untold death and destruction. Reports from Pakistani intelligence suggested the direct involvement of senior Kashmiri militants linked to al-Qaeda (which had been held responsible for the 11 September 2001 attacks). The arrests had to be made when they were because an attack was deemed imminent.

The terrorists planned to hide micro-bombs in false bottoms of opaque energy drink bottles, enabling them to still drink from the bottle if needed. Experts were reported to suggest that the explosives were probably stable peroxide material, similar to that used in the 7 July attacks of 2005. While it would be difficult to blow up an airliner completely with a small liquid-based bomb, it could be done by concentrating on weak spots (such as windows) or by a combination of bombs on the same aircraft.

Raids were conducted in London, Birmingham and Buckinghamshire to detain suspects. The majority were young British Asian men of Pakistani descent, many holding dual nationality. At least one, however, was a white British convert to Islam. Some international media sources claimed that at least five terrorists were still at large.

The police teams were conducting a meticulous search of all properties associated with the suspects and also initiated a widespread search of their local neighbourhoods – including woods.

The national threat level was raised to 'critical' – the highest possible – because Britain was still deemed to be at risk of an 'imminent' attack.

In SARF terminology, the risk event could be said to be the announcement of the terrorist plot and arrest of suspects. The declaration of the plot resulted in a series of secondary effects in quick succession. Strict security instructions were issued to airports and airlines on 10 August. They included a ban on all hand luggage, with the exception of essential items (e.g. medication). Gels and liquids were strictly banned, with the exception of baby milk (which parents were told they would have to taste before being allowed to take it on to the aircraft).

The immediate effect was chaos in airports: 185,000 people had been due to pass through Heathrow alone on 10 August. Hundreds of flights were cancelled and all delayed (some by many hours). All of this was happening at the height of the summer season. The CEO of the BAA, the airports operators, claimed that they had never before faced a security mandate of this scale and severity. Nevertheless, all seven of the BAA airports stayed open. Within the same day, most of the country's airports returned to normal, though delays persisted. The initial ban on short-haul flights into Heathrow was lifted by the end of 10 August, but by then many long-haul flights had also been cancelled. At Heathrow, crowds from the 314 cancelled flights were asked to leave, but it took hours for people to leave – many had packed car keys in checked-in baggage. The scene was replicated around Britain (at Manchester, Stansted, Gatwick, Birmingham, Glasgow, etc.).

Tightened security caused initial confusion among passengers with evidence that information and explanation was inadequate. Lengthy queues snaked around the terminal buildings. Passengers showed remarkable patience and restraint. Staff offered reassurance but had no information to supply. There was evidence of resignation on the part of passengers that they must tolerate this chaos in the interests of dealing with the terrorists. The authorities were not blamed for the problems. But the media are quick to condemn airport authorities for not having security systems and technology that can detect the sort of threat posed by modern terrorists. In the absence of good systems, the heightened security requirements were said to be likely to result in chaos at airports for at least a month.

By 11 August, media reports included comments from those who knew some of the people arrested. They were reported variously to be well respected in the community, peaceful, religious, pleasant, and converts to a devout form of Islam.

Since the technology of detection in airports and the international standards of security it demands have changed very little in the past three decades, calls for a revamp appear immediately on 11 August. Reports anticipate that the new hand luggage curbs may become permanent. This possibly causes more anxiety among the travelling public than the original threat. Images of people carrying their small number of allowed hand baggage items in transparent plastic bags appear everywhere in the media. It is suggested that the scare could speed the introduction of full-body X-rays and the use of sniffer or puffer machines. Failures in the ability of the authorities to introduce these changes earlier are condemned. The case of the 1994 attempts by terrorists to blow up a Philippines airliner using liquid explosives is used to illustrate that security improvements have not occurred quickly enough.

Already on 11 August, the press were explaining that travellers who had suffered delays or cancellations would face a struggle to get compensation or to claim on their insurance policies from airlines.

Also on 11 August, *The Times* (and others) was reporting that Muslim community leaders in Britain were 'braced for a backlash' and were 'warning politicians and the press not to exacerbate resentment within their community through Islamophobic attacks'. They argued that, as a result of the discovery of the plot, Muslims would be further stigmatised. It should be noted here that a two-sided backlash was anticipated – both against the Muslim community and by the Muslim community against the authorities whom some believed to be victimising them.

The international dimension of the plot is explained. The Pakistan authorities confirmed the arrests were a result of active collaboration between themselves and the British intelligence forces. The importance for Pakistan to be seen to be dealing with this case is emphasised because it has been accused of failing the international community by harbouring and training terrorists. In many of the stories there is a reference to the 7 July 2005 bombing in London and the fact that the perpetrators were British Muslims and some had been trained at madrasas in Pakistan. The link between the new plot and the earlier attacks is made.

Also on 11 August, the press report that £220 million had been wiped off the share value of British Airways (the main airline carrier in the UK) on 10 August as it cancelled hundreds of flights. Its profits were predicted to fall by £10 million for every day of disruption. Other airlines reported massive losses (including EasyJet and Ryanair). Investors were worried by the long-term costs of this security threat. It is stated that airlines had only just recovered from the 9/11 attacks. Other share prices fell, but particularly those of travel-related companies. Accountants were reported to have estimated that the single day of the terror alert cost the UK economy about £3.2 million for every hour of disruption.

President Bush is reported to have said that the plot to set off multiple explosions in US aircraft should serve 'as a stark reminder that this nation is at war with Islamic fascists who will use any means to destroy those who love freedom'. The possible link of the plot to al-Qaeda is made repeatedly. The parallel is drawn with the Operation Bojinka plot in 1995 in the Philippines, in which improvised bombs using liquid in contact lens solutions containers would have been detonated on a dozen flights over the Pacific.

Despite the arrests of the accused plotters, there is repeated mention that the threat has not gone away – the security level is still critical. It is re-emphasised that the security services have foiled thirteen terrorist plots in the previous year.

Even on 11 August, the press is reflecting on the errors the police and security forces had made in handling the 7 July 2005 bombings and the more recent failures of intelligence that had led to a raid on the home and arrest of two Muslims who proved to be innocent. The damaging details of the shooting of an innocent man, Jean Charles de Menezes, in the London Underground, which had

Box 9.1 (cont.)

occurred following the July 2005 bombings, were retold. The possibility that the police intelligence might be in error about this new plot is raised. Members of the Muslim community are reported to be sceptical about the police claims that a plot existed, claiming that it was being used to distract attention from governmental policies on the Lebanon–Israel conflict (which had reached a critical point). Non-Muslims also voice the argument that, if Britain was not involved in Iraq, not allied to the US, not active in Afghanistan, and so on, it would not be a target for terrorists. They use the plot as a means of attacking government policies across a broad spectrum.

By **13 August**, one newspaper was reporting 'Britain is facing a horrifying Summer of War blitz from Muslim terrorists – the police fear last week's airline plot was just the beginning'. It then revealed the security services were 'secretly battling another 30 Islamist murder plots'. On the same day, this newspaper called for the use of passenger profiling at all airports, ID cards and tougher border controls and an increase to the time suspects can be held without charge. The language in other papers was more muted, but the message was the same: as many as 1,200 people in Britain were involved in terrorism, many dozens of plots were being hatched, and an apocalyptic wave of attacks was planned.

BAA, which runs the major UK airports, is attacked by both BA and Ryanair for allowing Heathrow to move to 'meltdown'. Three days into the event, BAA was ordering airlines to axe one in three flights from Heathrow. This was put down to the fact that BAA could not cope with the intensified security checks required. Each transatlantic flight cancelled could cost the carrier up to £300,000. BAA was also beleaguered by a massive slump in its retail sales from airport shops as a result of the security restrictions on take-on baggage. BAA claimed that if the security restrictions required by government were maintained, then the delays would continue. The potential importance of passenger-profiling techniques to fast-track low-risk travellers is strongly mooted. However, a further source of delay was identified as coming from the USA, who required Advanced Passenger Information Screening to be done on all passengers outbound to the USA before the plane was allowed to leave the airport. These checks were taking up long periods.

Ministers are reported to actively reject the link between the terrorist plots and their foreign policy, particularly that in Iraq.

The broader significance of the arrests for the British Muslim community is reiterated. The need to address questions of integration, multiculturalism, religious separatism and so on is debated. The concept of the Muslim community having to deal with its own 'extremists' is promulgated.

14 August: Muslim leaders speak about their desire to modernise and to engage in the democratic process. The Home Secretary reports that the terror threat is still critical and further terrorist cells are being investigated. BAA explains that it cannot simply increase the numbers of security searches in order to reduce delays, because it takes a month to obtain security clearance for them. BAA indicates that the new security measures are not sustainable.

15 August: Government revises security rules to allow one small piece of hand luggage on the plane. A further terrorist suspect is arrested.

16 August: Ryanair again attacks BAA for 'paralysing' Stansted airport. BAA criticise government security measures – pointing out that terrorists could just switch their focus to flights coming into Britain and would be subject to no stringent checks such as those imposed in the UK. Inconsistencies in security checks were reported to be the topic for a meeting of European security ministers that day. A common approach to airport security in Europe was to be developed. The duty-free industry and airport retail worldwide reported having lost millions (mainly due to lost alcohol and perfume sales). Looting of lost luggage is reported – about 10,000–20,000 passenger bags had

gone missing since the alert began. David Cameron, leader of the Conservative Party, is reported to have accused the government of doing too little to fight terrorism and extremism. He also urged the introduction of a new law to allow the use of intercept evidence in court, the creation of a single ministerial post in charge of counterterrorism, a dedicated border police force and a replacement of the Human Rights Act with a British Bill of Rights. The proposals for security profiling of passengers are accused of leading to problems if they are based on ethnicity or religion, since it would further alienate the Muslim community.

17 August: Authorities evacuate the terminal at the Tri-State Airport of Huntington in West Virginia after a test on two plastic containers carried by a female passenger showed a possible explosive. On another flight, a woman outbound from Heathrow was found to have managed to bring several banned items on board. She was behaving erratically and claimed connections with Pakistan. The captain declared an emergency and diverted to Boston airport, escorted by two US F16 fighter jets. BAA was accused of a lapse in security, having allowed her to board the flight with proscribed objects.

18 August: Virgin Atlantic airline calls for a Competition Commission inquiry into BAA. Analysts suggest that the airlines will use the disruptions associated with the terror event to support their case for the break-up of BAA. The airlines object to BAA because they argue that it is a multi-tier monopoly: it is the monopoly owner and operator of its airports; it controls seven airports across the country; and it controls the shops that go into the airports.

A suitcase full of bomb-making equipment is found by police searching a wood close to the homes of some of the suspects arrested.

20 August: Reports that holiday-makers refused to allow their UK-bound flight to leave Malaga airport until two men who were 'of Asian appearance' were removed. The men were found to represent no threat and were sent on a later plane. UK Muslim leaders use this to illustrate the prejudice to which innocent Muslims are subjected. Police reported to be trying to track down sixteen potential suicide bombers trained at an al-Qaeda camp on the Afghan–Pakistan border. The fact that BAA had been bought by a Spanish company in July 2006 is reported in the context of questions about its capacity to respond to what has been a national crisis. Warnings emerge that there will be further chaos at airports in a few days' time as Britain has a bank holiday and the numbers seeking to fly swell again. Another security lapse by BAA is reported – a man is allowed through several checkpoints with neither boarding card nor passport. The Home Secretary is reported to be seeking powers to detain terror suspects without trial and to be demanding much tougher anti-terrorism powers. Whitehall is reported to fear that the Metropolitan Police Force is using the case as a means of redressing the bad PR it had received for earlier botched operations. Details of the sorts of security screening that will be introduced (including behavioural analysis and technological scanning) in the future are described. The problems with passenger profiling that use race or religion as a criterion were again debated.

Failure to find evidence against a suspect detained in Pakistan and thought to be the 'mastermind' behind the plot stimulates further questions about the reality of the threat.

Share prices of BA and EasyJet show recovery; Ryanair has not recovered.

21 August: Eleven suspects arrested on 10 August are charged. Police disclose they have discovered bomb-making and martyrdom videos (i.e. recordings made for broadcast after the suicide bombings have occurred). Eight of the eleven are charged with conspiracy to murder and a new offence of preparing acts of terrorism. The other three are charged with offences under the Terrorism Act 2000. Eleven other suspects remain in custody. One woman is released without charge. Very full details of the investigations conducted by the police are reported, including indications of the huge volume of evidence collected.

Box 9.1 (cont.)

The national state of alert is reported to have been lowered to 'severe'.

This is the point where we choose to arbitrarily cut off the description of this illustration. In reality, it would not be too far-fetched to say that the effects and the reinterpretations of the risk event will continue for many years. The line has to be drawn somewhere for the sake of practicality – even though it would be fascinating to follow it further.

A brief SARF analysis

Using the SARF approach to the analysis of even this small amount of data on the events that took place in the eleven-day period focuses attention upon the way the original risk event (the announcement of the plot) was followed by a complex set of amplification and attenuation processes, and by rippled secondary effects. The first interesting feature to notice is how quickly the amplification/attenuation processes start to have an effect, but also how very quickly the secondary effects occur. Within twenty-four hours we see the plot is not an isolated incident – there are many other terrorist activities under investigation – and the plot is just the tip of an iceberg of threat from the Islamic extremists. The plot is contextualised within a constellation of other thwarted and successful attacks and is talked about as being much worse than any other. It is even located within 'the war on terror'.

We also see immediate secondary political (nationally and internationally – particularly relating to foreign policy on Iraq, Lebanon and Afghanistan) impacts, economic impacts (e.g. airline share values), regulatory changes (e.g. security protocols), calls for legislative change (e.g. with regard to anti-terrorism laws), pressure for commercial restructuring (e.g. claims that BAA 'monopoly' should be dismantled), and intergroup tension increases (e.g. the response towards and by the Muslim community). Reputational issues come to the fore: the motives of the police; the competence of the airport authority; and trustworthiness or foreign policy probity of political leaders. It is quite startling to realise how quickly these secondary effects can occur.

The second interesting feature to note is that the secondary effects themselves serve to amplify and change the meaning of the original risk event. For instance, the fact that, under the increased pressure of changed regulations, there are failures of airport security, suggests that air travellers really are at greater risk of a successful terrorist attack. Also, the looting of lost baggage makes the risk event seem more grievous in its personal consequences; so does the problem identified with compensation and insurance claims.

The sequence of events also serves to highlight that it is necessary to consider the ripple effects for different groups of people and institutions. Every single target identified in Figure 9.1 as possibly affected through rippling was affected here. This risk event had global implications but also massive individual effects.

The third interesting feature to consider is the stigmatisation process that occurs for the Muslim community. It is particularly worth noting that not only does this occur (illustrated dramatically by the ejection of the two men from the Malaga flight and also by the calls for passenger profiling), but it is also anticipated by the Muslim community itself. This risk event is not the start of stigmatisation; it is just another basis for sustaining and extending it.

The fourth feature concerns the countervailing attenuation processes that were evident in some parts of the Muslim community. Some people were claiming that the accusations were false, that those arrested were not the sort of people who would be involved in an attack, that the security forces were engaged in a face-saving exercise and there really was no evidence of any plot. The Muslim community was not alone in voicing scepticism. Others were audibly questioning whether the

security forces had evidence and whether the supposed bomb-making method could possibly work in a modern aircraft. This representation might be seen to have a longer-term advantage: it attenuates the risk and would justify a return to the use of air travel.

This pattern supports the SARF assertion that amplification and attenuation can be going on simultaneously, driven by different interest groups. It may be important to recognise that this attenuation effort was concerned solely with the alleged plot itself (the original risk event); it did not extend to an attempt to reinterpret the secondary effects of the risk event (except in so far as passenger profiling using ethnicity was claimed to be victimisation). The amplification process was much more widespread: secondary effects were themselves treated as risk events in their own right and were then subject to amplification. For example, the effect of disruption on the airlines was identified as the genesis of a long-term and escalating risk for them in terms of profitability, but also for their customers because increased costs would be passed on in airfares.

This example of the unfurling of a risk event also suggests that if the processes at work in amplification and rippling are to be understood fully, a complex array of data would need to be collected in the wake of any risk event. The layering method described in this chapter offers one way to do this.

The final point worth emphasising here is that the example points to the significance of hazard sequences in determining the way amplification or attenuation works. This risk event was systematically described, and its importance calibrated, against other relevant events. Amplification of the risk looked at it in comparison with other attempts (like the planned Philippines aircraft bombing) or attacks (like the 7 July 2005 bombs in London or those of 11 September 2001 in the USA) – the similarities and differences were highlighted and the lessons and predictions that could be taken from the previous incidents were elaborated. The 10 August risk event was interpreted in the frame of these sequences. Similarly, the attenuation process used the same approach. The risk event was set against in this case a whole array of security and police force errors in accusations and actions against Muslims in the UK and internationally. The hazard sequence used was different, because this frame interpreted the risk event in terms of victimisation. Understanding further the use of hazard sequences in establishing the bases for amplification/attenuation would seem to be valuable.

2 Research based on SARF

Kasperson et al. (2003) provide an excellent review of some of the empirical studies to which SARF has given rise, and the presentation here owes a lot to their summary. It would be inappropriate to suggest that the studies 'test' SARF. Since SARF itself is not a theory and specifies no unambiguous testable hypotheses, it would be inappropriate to conceive of these studies as attempts to prove (or disprove) SARF. Instead, they are illustrations of some of the relationships that SARF considers important. Essentially, the studies suggest:

Risk signals

Hazards generate different signals (i.e. messages embedded in symbols, metaphors and images) over time – for instance, Kasperson et al. (1992) examined the 'signal stream' associated with the proposed siting of a nuclear waste repository at Yucca Mountain in the USA between 1985 and 1989 that appeared in a local newspaper, and showed that a shift occurred during this period

from a focus on the specific risk itself to issues of victimisation, distrust, villainy and unfairness. One can see something akin to this shift occurring in the case study presented in Box 9.2.

There is also a suggestion that some hazards have greater 'signal strength'. Slovic et al. (1985) report that those hazards located in the top right quadrant of the dread/known factor space (see Figure 2.5) have a greater capacity to generate symbols and images with high impact, perhaps linked to their perceived capacity to produce more serious secondary and tertiary effects. This suggestion seems plausible; however, direct evidence on 'signal strength' is not available.

Hidden hazards

A corollary to the argument that hazards generate different signal strengths is the proposition that some can be hidden by the process of attenuation. This is a very interesting and useful notion. Kasperson and Kasperson (1991) offer an explanation for the existence of 'hidden hazards'. They describe five aspects of such hazards that motivate attenuation:

- *Global elusive hazards* – involve a series of complex problems (international interactions, long time lags, diffuse effects, etc.) and their signal power is muted in many societies by the inequalities and fragmentation between nations and cultures.
- *Ideological hazards* – lie embedded in a system of beliefs and values that attenuates the consequences of the hazard.
- *Marginal hazards* – affect people who are at the margins of society, who have little power, and whose problems are not a focus of attention for mainstream society.
- *Amplification-driven hazards* – occur as a secondary consequence of other hazards and exist below the threshold of recognition (this can of course be a temporary phase in the life of a hazard).
- *Value-threatening hazards* – alter lifestyles and basic values but are not recognised because societal attention is elsewhere (e.g. concerned with what are considered to be more important issues, such as conflicts, profit and physical survival).

In analyses of environmental degradation and delayed societal responses, Kasperson et al. (1995) have illustrated the existence of such distinct hazard types.

Factors affecting amplification/attenuation

Kasperson (1992) reports six case studies of nuclear accidents. The conclusions were:

- The risk events were not predictably linked to amplification or genesis of secondary effects, and such effects seem to be mediated by

pre-accident trust in the relevant authorities and by the way the actual event was handled. Several factors may need to be present before an event will trigger an amplification process intense enough to initiate secondary effects.

Amplification/attenuation may occur simultaneously but at different levels in the social structure (e.g. attenuation may occur locally but amplification happen nationally).

If the risk is associated with economic benefits, attenuation may result. An example of this can be found in a more recent study. Sekizawa (2013) examined BSE risk perceptions in East Asian countries and showed that the attitudes of politicians (linked to political pressures in trade and their commercial advantage) were important in influencing amplification and acceptance of risk. There are, however, other bases for attenuation – these are discussed below.

There have been other studies that examine the factors that may affect amplification. For instance, McComas (2003) conducted a longitudinal study of members of a community facing the expansion of an existing solid waste landfill. She found that community members who attended initial public meetings about the proposal manifested intensification of the risk perceived and erosion of trust in those managing the site. There are many studies that show in relation to specific hazards that particular factors affect the representation of the risk. There is, however, no coherent pattern to these findings.

Brenkert-Smith et al. (2013) provide another useful illustration of the analytic use of SARF. Wildfire is a persistent and growing threat across much of the western United States. Understanding how people living in fire-prone areas perceive this threat is essential to the design of effective risk management policies. Drawing on the social amplification of risk framework, Brenkert-Smith et al. developed a conceptual model of wildfire risk perceptions that incorporates the social processes that likely shape how individuals in fire-prone areas come to understand this risk, highlighting the role of information sources and social interactions. They classified information sources as expert or non-expert, and group social interactions according to two dimensions: formal versus informal, and generic versus fire-specific. Using survey data from two Colorado counties, they empirically examined how information sources and social interactions relate to the perceived probability and perceived consequences of a wildfire. Their results suggest that social amplification processes play a role in shaping how individuals in this area perceive wildfire risk. A key finding was that both 'vertical' (i.e. expert information sources and formal social interactions) and 'horizontal' (i.e. non-expert information and informal interactions) interactions were associated with perceived risk of experiencing a wildfire. Their data argue that social amplification processes are multi-layered and interactive – just as the 2003 formulation of the framework suggested. Furthermore, the amplification processes are subject to all the mediation that has been previously described in relation to persuasion and influence (such as the effects of trust and experience) (Wachinger et al., 2013).

Role in deliberate risk-taking

Machlis and Rosa (1990) and Rosa (1998, 2003) suggested that the SARF could be used to explain how desired risks or deliberate risk-taking are interpreted. While some of the terminology in the framework (e.g. the use of the label 'victims') can be seen to be inappropriate for desired risk, the overall approach is applicable.

Role of the mass media

In the SARF, which focuses upon the significance of interpretation of risk through communication, it is inevitable that the mass media might be expected to play a fundamental role. There have been many analyses of the way the media report risks and risk events (see Chapter 6). Specifically in relation to the propositions of SARF, the work of Mazur (1990) is interesting. He analysed mass media coverage of nuclear power and chemical hazards and proposed a model with four interrelated propositions: (1) it is important to distinguish between the substantive content of a news story about a risk and the simpler image (signal) that the story conveys; (2) public concern about a risk rises as media coverage increases; (3) public action to deal with the risk increases or decreases in line with the volume of media coverage; (4) a small number of national media organisations are very influential in choosing which hazards receive attention at any one time. It is important to recognise that Mazur is not suggesting that any one of these propositions can be seen to capture the role of the media in the processes of amplification/attenuation. For instance, volume of coverage alone will not trigger heightened public concern. As Renn (1991) asserts, volume is only one route through which the media can affect public (or indeed institutional) concern. There are many elements in the presentation of the story, especially one which runs over an extended period of time, which will influence the way the risk is perceived. They include:

- the precise content of the information – particularly its capacity to arouse emotional responses or trigger associations with other concerns
- the format of the information – for instance, the order in which it occurs in a news bulletin or in the newspaper will signal importance
- contextualisation matters – for instance by juxtaposing a risk story with another that is also high risk, both stories could achieve heightened impact.

Frewer et al. (2002a, 2002b) illustrated the operation of the media in relation to amplification concerning genetically modified foods, arguing that people's risk perceptions do increase or decrease in accordance with the complex interaction of the volume of risk information provided by the media, the independent accuracy and actual content of the information, the evident disagreement between various actors in the risk debate, the extent of dramatisation of the risk information, and the symbolic connotations incorporated into the coverage.

Burgess (2012) looked at the operation of the media in the attenuation of the perceived risk of the European volcanic ash cloud of 2010 following the eruption of the Icelandic volcano Eyjafjallajökull. The eruption was notable because the volcanic ash plume disrupted air travel in northern Europe for several weeks. Burgess analysed the character, extent and patterns of media coverage of these events. The pattern is clear: the ash cloud was not amplified as a wider threat – despite the economic implications of the travel chaos. As well as the absence of major incident and casualties, two interrelated factors are highlighted to explain this result. Emphasising the importance of hazard duration, the unexpected arrival and short-lived character of the ash cloud was one important factor that limited the potential for sustained media amplification. More broadly, this was considered an 'act of God'. Burgess suggests that contemporary media risk narrative requires a focus for institutional blame attribution, and without a plausible candidate amplification may not acquire momentum. Interestingly, the civil aviation authorities adopted a heavily precautionary approach – grounding all flights that might have even theoretically been affected by the ash cloud. This caution was based on the absence of good data on the safety parameters that might operate with such a plume in relation to modern airplanes. The longer-term risk amplification effects of the Eyjafjallajökull eruption may actually only be seen when the next eruption occurs and the aviation authorities need to decide whether to take the same precautionary approach. Some commentators argued that the 2010 regulatory reaction was 'over the top'. If it was replicated in a subsequent incident, and no mishap occurred, the potential for blaming the authorities for unnecessary caution would be present. If it was not replicated, and some accident did occur, the potential for blaming the authorities would again be present. It is hard to see how amplification would be completely absent in regard to future plumes.

Lewis and Tyshenko (2009) offered another suggestion about the ways in which attenuation may come about. They studied the reactions of the Canadian public to news of BSE being detected in Canada. The Canadian public showed a markedly different reaction to the news of domestic BSE than the furious and panicked responses observed in the United Kingdom, Germany, and Japan. While other countries displayed social amplification of risk, Canada experienced a social attenuation of risk. They suggest that the attenuated reaction in Canada towards BSE and increased human health risks from variant Creutzfeldt-Jakob disease (vCJD) was due to the social context at the time when BSE was discovered domestically. They propose that mortality, morbidity and psychosocial impacts resulting from other major events such as severe acute respiratory syndrome (SARS), West Nile virus (WNV), and the US–Iraq war made the theoretical risks of BSE and vCJD a lower priority, reducing its concern as a risk issue. This idea that attenuation is sometimes a product of there being other things to worry about is interesting. It fits the findings of Breakwell and Barnett (2001) reported earlier on the behaviour of media editors – who will channel their coverage to the 'biggest', high infotainment risks. If the media attention is elsewhere on other hazards, attenuation may occur almost by default.

As a general rule, as was indicated in Chapter 6, it is not sensible to talk about 'the' effects of 'the' mass media. The mass media are highly differentiated (not just between types of media – the press, the radio and TV, and increasingly the web-based providers – but between forms within these types). If there is one rule to be applied to them, it is that no single rule can be applied to them. Since the structure of media provision has changed so much in the last few years as information technologies and the public uptake of those technologies have changed, it is truly uncertain how the media work to amplify risk or to generate ripple effects. That they do have these effects is undoubted (Vaughan and Seifert, 1992).

The real question is how they have these effects in an era of twenty-four-hour news and immediate access through personal digital communication. Researchers have begun to address this question. For instance, Chung (2011) provides an interesting analysis of the dynamic process of risk amplification in the Internet environment using responses to a proposed high-speed rail tunnel construction project in South Korea. He used material publically available on the web to trace the development of amplification of concerns about the project. It is worth noting that the methods for the analysis of 'Big Data' that is derived from the web are becoming more sophisticated and generally available. Tracking paths in the development of a risk representation and identifying patterns of access and use of different forms of representation is becoming very much easier. It is possible to monitor, in real time, the impact of new postings on the web upon the traffic and content of other actors in cyber space. Web-behaviour analysis introduces for SARF theorists a whole new capacity for modelling amplification and attenuation. It also allows intervention studies – since the researcher can also present material on the web. Before getting carried away with the bright new day that web-based research offers, it is worth saying that looking at the web world in isolation is just part of the story of amplification processes. It will also be necessary to trace the relationships between what happens in cyber space and what happens in other media of social amplification. That is an even more exciting arena for study.

The role of complex organisations

SARF specifies that organisations and institutions will play a role in amplification and attenuation of risk events but will also be the recipients of the impacts, through the ripple effects, of those events. We have already seen in Chapter 8 many of the ways in which complex organisations moderate and mediate the risk event: through the way they plan for it, the way they manage it, the way they recover from it, even through the way they may deny or hide it. Freudenburg (1992) examined the characteristics of organisations that serve to attenuate risk signals. They include lack of commitment to the risk-management function, bureaucratic slowness in the flow of news (particularly bad news), the existence of gaps in corporate responsibility for hazard vigilance, mismatches in resource allocation and goal-setting, and a culture of risk-taking by the workforce.

Stigmatisation

Kasperson et al. (1988) hypothesised that stigmatisation was one of the four major mechanisms (the others being: the use of heuristics and value filters, changes in intergroup relationships and modification in risk signal values) whereby the amplification process can generate ripple and secondary effects. In the past, stigma has been used to refer to the negative imagery associated with undesirable individuals or social groups. Kasperson et al. proposed that hazards could also be stigmatised. Hazards that are stigmatised would be shunned and attacked in the same way that other stigmatised objects are treated. The role of stigmatisation is further considered in Chapter 6. It is important not to become mesmerised by the word 'stigmatisation'. Essentially, all we are talking about is the fact that negative images are attached to hazards. Once attached, these images have the power to attract other negative images to the hazard. The package of negative images stimulates not only negative emotions but also biases in cognitive processing of information. However, the stigma is not necessarily just attached to the hazard itself; it can transfer to places, people, products or technologies associated with the hazard. Thus the geographical location of a GM crop, the tomato sauce produced by those GM crops and the firm that makes the tomato sauce can all find themselves stigmatised by the process that assigns stigma to GM technologies. This form of 'stigma contamination' is a secondary effect of risk amplification.

Kasperson et al. (2001) extended the social amplification framework to focus upon stigmatisation. In this version, the risk event generates a flow of communication that influences risk perceptions and images, but this simultaneously 'marks' associated places, products and technologies. 'Marking' is said to involve the selection of some attribute of the object. This can be tied to labelling the attribute (for example, 'Frankenstein food' was a label attached to GM food). Marking pinpoints the negative aspects of the identity of the product, place or technology that has been derived from the hazard. It is this, usually easy-to-remember, label that is reused in the communication process and which shifts the balance of the evaluation of the object towards the negative. The stigma is thus attached to the object and can stimulate further secondary effects – for instance, in the public acceptability of the object or in regulatory impositions upon it. Since stigmatisation is a potent process, and one which is relatively uncontrollable once initiated, it needs to be researched further.

The role of trust and confidence

Kasperson et al. (2003) point out that trust was not a factor included in the original framework as a determiner of the amplification process. They argue that it should have been. The significance of trust in the source of a message in determining the impact of risk communications has been examined in Chapter 6.

It is worth reiterating here that the efficacy of any communication will be driven by the extent to which the communicator is trusted, but the relationship between trust and amplification/attenuation is not mapped out. While it is possible to study the relationship between trust in a communicator and belief in their message or

compliance with their instructions at an individual or societal level, it is not so simple to study systematically the relationship between trust and amplification/attenuation holistically. This is because the process of amplification/attenuation is one that occurs through the interaction of many communicators (many stations). To isolate one message source and to examine the extent to which it is trusted might be possible. To examine every relevant message source and determine how their relative trustworthiness affects the way their messages are received might be possible. However, to assess the overall, dynamic, interactive level of trust in the multitudinous sources of communication in the aftermath of the risk event might be rather difficult, not just empirically, but also because we have no model of how trust in a complex network of often conflicting sources is generated or changed. There is the added complexity that, when dealing with risk amplification and ripple effects, we are not just dealing with individual reactions to this complex panoply of sources. We are dealing with institutional and organisational responses, sometimes internationally. Estimating levels of trust in any coherent way would be challenging, to put it mildly. Add to this the fact that the dependent measure is not an individual's changed perceptions or behaviour (or even an institution's changed perceptions or behaviour) but rather the entire system's amplification of risk and the broader ripple effects. This does make an empirically tested model of the relationship between trust and amplification seem a remote prospect (even allowing for the interesting work of Wachinger et al. mentioned above).

Nevertheless, there is no need to abandon the examination of trust and amplification. The task has to be broken into its component parts. Particularly promising is the work that explores what happens when an observable and quantifiable decrement in trust occurs with regard to one element in the complex communications network. As stated in Chapter 6, Slovic (1993) suggested that trust is slow to develop and easy to destroy. He posits the asymmetry principle to explain why it is easier to destroy than to earn trust: negative events are more visible than positive events because they are often more specific and less indistinct. Negative events are the basis for the erosion of trust and, since they are more likely to grab attention than positive events, trust is more likely to be destroyed than built. Since risk events are typically negative, it does suggest that trust will be eroded at the very moment that risk amplification processes will come into play.

Ripple effects

Kasperson et al. (2003) recognise that there has been little empirical research that has specifically explored the relationship between the amplification/attenuation processes and ripple effects. There is obviously research that explores the secondary effects of a risk event. There are many examples elsewhere in this book that illustrate how organisations, economies and regulatory systems have been changed following a risk event (e.g. the Chernobyl accident, the BSE inquiry, the mox incident, etc.). However, these examples do not have a detailed analysis of how amplification occurred and how this directly induced secondary effects. It can be assumed that it did and that information flows in these events

were shaped in the way SARF suggests. Yet what elements of the amplification process are causally linked to which secondary effects? It is notable that some work has recently begun on this question. Giesecke et al. (2012) report their modelling of the ripple effects of a hypothetical catastrophic event – an attack using a radiological dispersal device (RDD – essentially a dirty bomb) centred on the downtown Los Angeles area in the USA. They proposed two routes through which such an event might affect regional economic activity: (i) reduction in effective resource supply (the resource loss effect) and (ii) shifts in the perceptions of economic agents (the behavioural effect). The resource loss effect relates to the physical destructiveness of the event, while the behavioural effect relates to changes in fear and risk perception. Both affect the size of the regional economy. RDD detonation causes little capital damage and few casualties, but generates substantial short-run resource loss via business interruption. Changes in fear and risk perception increase the supply cost of resources to the affected region, while simultaneously reducing demand for goods produced in the region. They used results from a nationwide survey, tailored to their RDD scenario, to inform their model values for behavioural effects. Survey results, supplemented by findings from previous research on stigmatised asset values, suggest that to remain in the region affected by the RDD, households may require higher wages, investors may require higher returns, and customers may require price discounts. They show that because behavioural effects may have lingering long-term deleterious impacts on both the supply-cost of resources to a region and willingness to pay for regional output, they can generate changes in regional gross domestic product much greater than those generated by resource loss effects. This sort of study is a promising way to explore ripple effects. Of course, there can be arguments about the validity of predictions of reactions based on responses (via self-report in a survey) to a hypothetical scenario. However, the important thing here is not the specific predictions. It is the attempt to provide a coherent and systematic approach to modelling of the ripple effects in response to a complex incident.

There is a further empirical lacuna: little is known about the relationship between different secondary effects – either in terms of the groups/institutions affected or the types of effect. Modelling in this area would be a valuable start in organising the ways that we might think about systematically collecting data following real incidents.

3 Critiques of SARF

There have been various critiques of SARF. Many have been based upon a misunderstanding of the purpose of the framework. Some of these have criticised it for not being a theory (i.e. complete with predictive relationships between component concepts). Since SARF did not set out to be a theory in the first place, this is rather unfair. It is reminiscent of criticising a leopard for not being a horse.

However, beyond that form of criticism there are some other types of attack on SARF. For instance, Rayner (1988) did not like the metaphor on which SARF is based. He thought that it could be taken to imply that there is an underlying 'real' risk that is then 'distorted' by social communication processes. He also considered the framework implies passivity on the part of those receiving communications. Neither of these two implications was actually intended by SARF researchers. In fact, a moment's consideration of the framework should reveal that there is a fundamental social constructivist assumption in it. There is no suggestion that amplification produces a distortion in the sense of something that is incorrect or in error. Amplification/attenuation produces representation of the risk event. The framework is not concerned with evaluating whether these representations are right or distorted. The representations once generated are the functional reality.

This in turn is not meant to imply that a risk event is 'merely' a social construct. According to SARF, risk events have real consequences and these may be direct (the physical changes induced) and indirect (derived from the social processing of the risk – stigmatisation, group conflict, loss of trust, etc.). Rosa (2003) presents a detailed unpacking of the logical and philosophical status of the risk concept as it is used in SARF. He points out that there is a tendency in SARF expositions to avoid dealing with the question of whether the risk is 'real' by dealing with whether its consequences are 'real'. According to Rosa, this leaves the question: What is the object of amplification? Rosa proposes that SARF should clearly embrace a realist definition of risk as its starting point (based on ontological realism – i.e. the assumption that the world exists independent of percipient actors) and then be explicit about the social and cognitive processes that transform it into a social construct. While his argument is well made, it may be a retrograde step to seek to revisit these definitional and philosophical questions. Rosa, in turn, would need to be able to answer the question he originally posed: 'What is the real risk?' Empirically, how can he identify the real risk prior to any social representation of that risk? Surely, the moment that an individual is conscious that a physical event has occurred, representation processes are already implicated. This is not to assume that there is no world other than the one we create through representations. But it is to assume that in order to analyse that world we must have engaged in representation of it. The epistemological and ontological debate would seem to be never-ending. Perhaps a more useful way to proceed is to agree that the task is to properly understand the cognitive and social processes that are at work from that first moment of awareness. This is not unlike the position taken by the Astronomer Royal, Sir Martin Rees, about the genesis of the universe. He accepts that we do not know what preceded the Big Bang – and cannot therefore dismiss the possibility that God was at work – but the task is to map everything that happened subsequently without being too concerned about what the deity may have been doing.

Another form of attack, derived from the accusation that it is not a theory, is that the framework is incapable of offering any new insights beyond what other models already offer (Wåhlberg, 2001). The counter to this is provided by Kasperson (1992) when he says that SARF is designed to bring competing

theories and small-scale models into direct conjunction or confrontation and allow their relative contributions to be explored, to provide a structure in which an array of fragmented empirical findings can be subjected to comparative interpretation, and to motivate new questions about the relationships between its conceptual elements. In fact, Kasperson et al. (2003) claim that a particular strength of the framework for developing policy interventions is its capacity to mesh together emerging findings from different avenues of risk research. Renn (2011) has shown how this can be done with regard to responses to the risks of climate change.

Other commentators have highlighted the relative simplicity of the model of risk communication that it encompasses. Handmer and Penning-Rowsell (1990) criticise the apparent one-way transfer of information that is assumed in SARF. This misconception may be forgiven because the original 1988 article was not explicit about the complexity of interaction feedback loops in the amplification process. The Kasperson et al. (2003) figure (Figure 9.1) representing the SARF eliminates the scope for this misreading of the original intention by showing the feedback channels.

Some (Rip, 1988; Svenson, 1988) have argued that the SARF is too focused upon individual level dynamics and not enough on the societal level. This criticism may apply less in the first decade of the twenty-first century after the further specification in the framework of the role of stigmatisation and social trust besides the work on organisational inputs to the amplification and ripple processes.

A final criticism probably has more substance. The SARF is said to underanalyse the way the mass media work in the amplification and ripple processes. Of course, the development of this analysis can be seen as ongoing. Kasperson et al. (2003) admit that the framework should be able to describe the amplification and attenuation rules used by the media institutions in their role between government and sections of society. Indeed, it should also be able to identify the amplification and attenuation rules that apply to other institutions.

Breakwell and Barnett (2001) have argued that some refinement of the description of amplification processes might help to eradicate some of the difficulties that people have, both with the metaphor underlying SARF and with the movement towards using it to make predictions of what will happen following a risk event. Kasperson et al. (1988) in their original paper stated that amplification denotes the process of intensifying or attenuating signals during the transmission of information from an information source. In saying this, they were following the classic communications system terminology. However, in their own work they were actually using amplification to mean something more than quantitative intensification or attenuation. In fact, they use the concept to refer to qualitative restructuring of the signal (message) – a change in its meaning or significance, not just a change of degree.

Breakwell and Barnett suggested that the variety of different modifications that amplification can bring about should be better explained. They started by suggesting that, as a bare minimum, amplification should be treated as the generic term for these processes and intensification should be recognised as a discrete process. They also argued that intensification and attenuation inevitably (because of their common language meanings) are interpreted to be concerned with quantity. They

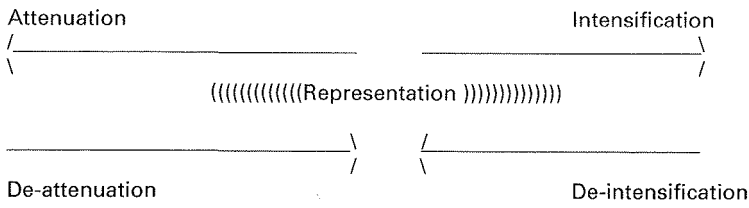

Figure 9.2 *Amplification processes*

proposed that some communication following a risk event will be concerned with establishing the 'representation' of the hazard and this may be predominantly about the characteristics or qualities of the hazard not its severity. They also point out that there are separate processes of de-intensification and de-attenuation that can occur. De-attenuation is not quite equivalent to amplification because it can be a process of pulling the image of the risk back from a low level but not reaching the point at which it started. Similarly, but obversely, de-intensification is not the simple equivalent to attenuation. Figure 9.2 presents the relations of these processes. Following Breakwell and Barnett, it would be useful to ensure that separate measures of intensification, attenuation, representation, de-intensification and de-attenuation are considered in empirical studies of amplification processes. In fact, Poumadère et al. (2005) provide an interesting example of how de-attenuation can occur. They describe how the dangers of heatwaves have been attenuated in France in the past but, as a result of the 2003 heatwave in that country, have been de-attenuated.

4 The layering method

It is easy to see from the Box 9.1 illustration that any researcher who wishes to fully understand amplification and ripple processes involved in a significant risk event will need to collect data at many levels: the psychological, sociological, political, economic, legal, technological and scientific – to identify only the main requirements. Arguments made here would also suggest that historical data would be vital. Such multi-level data collections are rare. They are time-consuming, they require enormous resources if they are to be done properly, and they require multi-disciplinary expertise. Even when researchers see the value of such an analysis, they can be dissuaded by the practical difficulties it entails.

Nevertheless, when it can be done, it may be the route to a thorough exploration of amplification and ripple phenomena. Breakwell and Barnett (2003b) have suggested one approach that might be more regularly used. This method, which they have called 'the layering method', entails:

- Collection of data that are situated at various levels of analysis. At the individual level this may include evidence of cognitions, affect and

behaviour. At the societal level it might use data at both structural and processual levels. For instance, it could include evidence of shifts in political policy, the structure of groups, the relationships between groups, communication patterns, economic indicators, scientific and technological innovation or practices, and so on. Effectively, the task is to collect data which reflect what is happening to the individuals and institutions (defined broadly) that might be affected by the risk event.

- Data from these different levels are 'layered' such that it is possible to see for one moment in time the data at each of the levels that are relevant to the amplification and ripple effects of the risk event.
- Data from each of the levels are also collected over time, allowing multiple time-points to be compared. These comparisons can be between different times on the same level of analysis. For instance, attitudes might be tracked over time. In addition, these comparisons can be between levels of analysis over time. This entails identifying the temporal profiles in data across levels of analysis. For instance, while attitudes (e.g. health attitudes) are tracked over time, the incidence of a particular illness is also tracked with the same data sampling time-points.

The method generates layers of data arranged at different levels of analysis tied together by a clearly defined time frame. The method does not stipulate which levels of analysis should be used. It does not determine how data should be collected. It does not require a particular type of statistical analysis. The method is rather a way of getting researchers to think about relationships between data at different levels of analysis and ensuring that they take temporal sequences in data seriously. It is, in some ways, ideally suited to the SARF approach. SARF requires multidimensional approaches to data collection if it is to evolve towards predicting amplification/attenuation and ripple effects. The layering method can be used to identify the relationships between the various components in the SARF. For instance, it can be used to look at how, following a risk event, the various 'stations' react and interact, the information sources and channels are used, the behaviour patterns of individuals and institutions change, and the legislative, economic, political, etc., effects appear. Box 9.2 illustrates the sort of structure for data collection that the layering method generates.

Breakwell and Barnett (2003b) present two examples of the use of the layering method, analysing data concerning developments following the official notifications of, first, the BSE/CJD hazard (1988–2000) and, second, the HIV/AIDS hazard (1984–2000). They show how the formal history of the diseases unfolds in terms of government pronouncements and actions. They show how the media represent the diseases throughout this time. They provide evidence of public attitudes towards the diseases during the period. Economic and medical data relevant to the diseases through the period are presented. Since their analyses are reliant upon a variety of sources (e.g. individual research projects, government

Box 9.2 The layering method

Indices of each theoretically important element in the amplification/attenuation or ripple processes should be mapped on the timeline. For instance, a not exhaustive list:

- assessment of estimated risk of the hazard and levels of concern (perhaps by each or at least several significant 'stations')
- physical assessments of the risk event impact (e.g. number of deaths, number ill, area evacuated, etc.)
- volume of messages about the risk event and its implications (identified by source)
- valence of messages about the risk event and its implications (identified by source)
- economic consequences of the risk event
- political consequences of the risk event
- legal consequences of the risk event.

Time Zero . . . . . End Point

Timeline (measured in whatever unit seems appropriate – hours, days, weeks, months, years, etc.).

Time Zero may be the point immediately after the risk event occurs, but it could be earlier if data are available. This may be enormously valuable, because then the nature of the impact of the risk event upon ongoing processes can be better estimated.

Preferably these indices should be mapped on to the timeline graphically. Juxtaposing each of the indices chosen on the timeline graphically may be artificial, since the scales on which each index will be measured will probably differ. However, that sort of superimposition of the profiles of each of the indices in terms of the same timeline is very informative. It highlights the simultaneity or disjuncture of the amplification/attenuation and ripple effects. It can throw into stark relief the way sometimes different 'stations' are moving in opposite directions. For instance, had the layering method been used to examine the case of the 10 August 2006 terrorist plot, it could have exposed the way elements of the Muslim community tended to attenuate and elements of other communities tended to amplify the hazard.

The layering method is also most likely to reveal feedback loops and interactions in the amplification/attenuation process, because it requires the researcher to look over time and beyond bivariate relationships. This is an advantage to those working with SARF, because there have been claims in the past that they treat the amplification process as unidirectional.

statistics, information from commercial sources, etc.), there are problems in matching perfectly the time frames over which data were collected. Nevertheless, the examples given illustrate that the layering method could be a powerful tool in examining amplification and ripple effects. For instance, they show from their BSE/CJD analyses that levels of public anxiety about food hazards are not related directly to the volume of media reportage of those hazards. They show that apparent levels of public concern are highly dependent upon the method used to elicit information and provide evidence that different subsections of the public move in opposite directions over time in the level of their concern. They also indicate that the amount of government spending on research concerning CJD/BSE is not related in any simple way to public concern levels and suggest

that this pattern of government spend on research into these diseases is not simply related to the number of cases of the diseases – at certain points in the cycle, the rate of disease declines and the amount of research expenditure increases. Their analysis is correlational and inevitably partial, given its reliance upon secondary sources, but the study provides some sense of the scope that could be achieved by research that adopted the layering method.

5 Hazard sequences, hazard templates and hazard negotiations

Following detailed studies of a series of risk events using the SARF approach and implementing the layering method, Breakwell and Barnett (2001) suggested that there were certain discernible regularities in the way in which amplification processes worked that could provide the basis for the development of a more predictive model. They highlighted the roles of what they labelled 'hazard sequences', 'hazard templates' and 'hazard negotiations'.

Hazard sequences

This is a simple notion: any one risk event is often represented or conceptualised as part of a sequence of risk events that share common features. So, for instance, a train crash will be viewed within the frame of a series of other train crashes, just as the terrorist plot against aircraft used in the Box 9.1 illustration was referenced in terms of other terrorist attempts and attacks. Barnett and Breakwell (2003) report how the 1995 oral contraception pill scare was reported and was interpreted in terms of other health scares that concerned either oral contraceptives or hormone replacement therapies. The existence of the hazard sequence allows the new risk event to be located in terms of its severity and meaning because it offers the backcloth of knowledge about similar events in the past. Reference to other past risk events can also provide the emotional connotations necessary to achieve either intensification or attenuation.

Following any risk event, there is the scope for interested 'stations' to seek to construct the hazard sequence that works best for their own purposes. The hazard sequences that are chosen and the way they are used should be the object of research. There may be certain obvious similarities between the substance of a series of hazards (e.g. they are all bomb plots) that encourage their use in a hazard sequence. They have to be readily identifiable as falling within the same category in some respects, because otherwise the sequence could not be used to add value and ease to communications about the risk event. However, sometimes the link between the hazards used in a sequence is more tenuous. For instance, in the case of the mox incident at Sellafield (described in Chapter 8), the hazard sequence concerned not just safety lapses (which are similar in substance to the risk event) but also risks associated with the financial viability of the company. Together the

safety and financial risks were used to intensify concern about the new risk event. The point to remember is that hazards in a sequence can be of totally different types: technical, managerial, financial, etc.

Hazard templates

This idea to some extent flows from the notion of hazard sequences. Breakwell and Barnett (2001) suggest that, when a new risk event occurs, the way it will be represented will be determined by the 'templates' that already exist for the representation of that type of risk. The template will provide a ready-made phrase to be used about it. It will provide common explanations for the origin of the risk event, the individuals, groups or institutions who should be held responsible, the forms of remedial or punishment action that should be taken, etc. The form of the template is roughly common across hazards, but the substantive content will differ widely. So, for instance, the template for a multi-car smash on the motorway in fog (e.g. reckless drivers, driving too close and too fast; poor signage; overcrowded motorways causing increasing occurrence; need for improved driver training and motorway control; efficient response of the emergency services who worked tirelessly) is different from the template for an outbreak of food poisoning in a hotel (e.g. poor hygiene; poor management; inadequate regulatory controls; increasing incidence of such cases). Nevertheless, some underlying similarities emerge: the cause, the significance, the responsibility and the redress.

These templates are commonly used by the mass media to structure their stories but they are also the frameworks that lay people use when they come to talk about a new risk event. They appear to have a risk vocabulary and rhetoric that is built upon understandings and expectations of the way different hazards work. These understandings and expectations are shared to varying degrees. The issues of how, and why, and when they are shared are considered further in this chapter.

Breakwell and Barnett (2001) note that the same template will often be used for different hazards identified to be part of a sequence. Also, the template will affect the type and amount of information which is sought and used.

Where a hazard template is initially absent, as in the case of a complete novel risk, it can be anticipated that the hazard may be linked to older, partially relevant templates. Over time, it will evolve its own. It is possible that before a template is established attenuation of the risk may occur. If not 'active' attenuation, it may be that passive attenuation through absence of attention to the hazard occurs. An example may arise from work of the perception of risks associated with nano-technologies. There have been studies of how nanotechnology is perceived. It is interesting that the concept of nanotechnology covers many new materials and applications. The costs and benefits are very little understood. The risk represen-tations in some instances, in the press, have been very negative in affective tone but the evidence for harm is absent. It is only the possibility of indescribable and yet to be proven damage that can presented. Pidgeon et al. (2011) suggest that

study of perceptions, at so early a stage in the development trajectory of a technology, is probably unique in the risk perception and communication field. As such it also brings new methodological and conceptual challenges. These include: dealing with the inherent diversity of the nanotechnology field itself; the unfamiliar and intangible nature of the concept, with few analogies to anchor mental models or risk perceptions; and the ethical and value questions underlying many nanotechnology debates. Against this backdrop, Priest et al. (2011) found in a panel study in the USA that no strong concerns about nanotechnology emerged over the three years. Neither amplification nor attenuation appear to have been occurring.

Hazard negotiations

Following a risk event, all those affected, directly or indirectly, are likely to have something to say about it. While the channels available to them to 'have their say' will vary in salience, there will be multitudinous voices. Amplification processes (*note*: they are taken by Breakwell and Barnett to encompass intensification, attenuation, representation, de-intensification and de-attenuation) will consequently involve the probably simultaneous presentation of varying messages about the risk event. The extent to which they are at variance will inevitably differ across risk events. However, to the extent that the sources of messages are aware that other messages are promulgated, they have the task of responding to these alternatives. This is where the concept of hazard negotiation has a role.

When 'stations' find that they are broadcasting messages about a risk event that are at variance with each other, there is scope for them to attempt to negotiate a common interpretation or, if this proves impossible, at least to seek a compatible set of interpretations. There are endless examples of the ways experts and lay publics differ in the representations that they generate about risk events. Many have been illustrated in this book (e.g. MMR, GM foods, naturally occurring radon gas, etc.). Often the differences in representation of the hazard are not reconciled. The public consultation mechanisms described in Chapter 6 can be seen as one route through which attempts to reconcile them are made. Such 'hazard negotiations' are formally structured exchanges with clear rules of engagement.

Yet often the exchanges are less peaceable; the negotiation takes place within conflict. For instance, this may be the case where protesters resist some change in their environment. The siting of mobile telecommunications masts has incited enormous resistance in recent years. Local residents claim health hazards associated with the masts, while the telecoms companies insist there is no significant hazard. Under these circumstances, the representations of the hazard may simply coexist in opposition, but they may also evolve to take account of each other's existence. The protesters' representation of the hazard is refined to protect itself against the company's representation – and vice versa. This is a form of hazard

negotiation. It is not a negotiation that leads to reconciliation and agreement. In fact, it is one which may even solidify and strengthen the opposing representations. Hazard negotiation is the dynamic process whereby different agents reform their own representation of the hazard while simultaneously influencing the representations that others hold of the hazard.

Breakwell and Barnett illustrate one way in which this occurs in a study of the reactions to the decision by Shell to expand their natural gas liquids facility in Fife, Scotland. An action group had originally opposed the establishment of the facility during the period 1977–9. Their representation of the risk levels was rejected at a public inquiry and the facility was approved in 1979. The local risk was said to be outweighed by the national benefits, the positive local socio-economic impacts, and the argument that the plant could be designed to operate within an acceptable level of hazard. The action group focused their representation of the hazard upon the health and safety risks it entailed, but also the negative impact the plant would have upon the environment (i.e. noise, visual and marine pollution, interference with tourism and agricultural and heritage loss). In response to the action group's protests, planning permission for the facility imposed conditions to minimise environmental impact. The two representations of the hazard remained at variance: the action group viewed it as a real and present health and safety risk and threat to the environment; the company (and planners) regarded it as a manageable, controlled hazard with enormous social and economic benefits. The action group succeeded in making the company respond to its concerns in terms of design and operational constraints. This of course served to re-emphasise the representation of the site promulgated by the company that it was indeed safe. In 1994–6, Shell made an attempt to extend the facility. The same action group was revived. On this occasion the representation of the hazard that it presented differed. The action group emphasised the danger to air quality, arising specifically from benzene, which has been alleged to have carcinogens and to be linked to leukaemia. The action group also used a risk event that had occurred recently to reinforce their safety fears (a liquid petroleum gas tanker had broken loose from its moorings at the Shell jetty and, although no serious injuries resulted, it could be used as an exemplar of what was possible). Interestingly, on this occasion, Shell was asked to carry out a societal risk assessment (SRA) of their operations in the area and to analyse the probability of large numbers of fatalities resulting from any accident. Before the SRA was complete, Shell decided to withdraw its application to develop the site. In order to limit damaging speculation, Shell finished and publicised the SRA, which concluded that the risk levels from the shipping operations to the local community were very low and well within limits used by the Health and Safety Executive (the relevant regulator). Shell furthermore decided to develop a strategy for active dialogue with the local community in the interests of improving understanding and acceptance of their operations. In terms of hazard negotiation, the Shell example offers two clear insights: the action group chose to shift its representation of the hazard over time in order to pursue its resistance; and the company sought to improve the flow of communication and

allow 'negotiation' of the representation of the hazard in order to pursue its business. The example also serves to show how the hazard negotiation can be extended in time (close to twenty years, in this case). Finally, the example illustrates how vital pressure groups can be in imposing the need for hazard negotiation. The role of minority influence or pressure groups is considered further elsewhere in this book.

Although it is probably obvious, it may be worth being explicit that all aspects of the processes of amplification (including representation) will in large part determine the mental models (Bostrom et al., 1992, 1994a, 1994b) that individuals hold about a hazard.

6 The 2008 financial crisis and 2008–2012 global recession

No book on risk that was published after 2008 could fail to consider the financial crisis of 2007–8 (also known as the global financial crisis and the 2008 financial crisis) and still be worth its salt. Perhaps this is the appropriate place in this book to use the 2008 financial crisis and the global recession it precipitated as an illustration – particularly of hazard sequences, templates and negotiations.

The 2008 financial crisis is considered by many economists to be the worse since the Great Depression of the 1930s. It resulted in the total collapse of large financial institutions, the bailout of banks by national governments, and massive downturns in stock markets around the world. In many areas the housing market also suffered, resulting in evictions and foreclosures on an enormous scale (the US housing 'bubble'). The role of subprime mortgages became clear. The concept of 'toxic debt' entered common parlance. Businesses, dependent upon credit lines that suddenly disappeared, went broke. Widespread unemployment ensued. The recession contributed to the initiation of the European sovereign-debt crisis. Governments around the world had to change their economic policies – starting an era of stringent cuts in spending in some (so-called austerity) and in others attempts to engender economic regrowth through 'quantitative easing' (pushing cheap money into the markets). The European sovereign debt crisis materialised. Currencies were devalued. The very existence of the monetary union (the basis of the euro) in the European Union was threatened. Economic migration grew rapidly. Immigration in some more affluent countries became a more salient critical issue. Public trust in governments to manage the crisis slumped in most countries. Governments were overthrown or fell. 'Technocrats' (who were thought to understand the financial system and how it should be managed) were introduced to lead governments. Political unrest emerged and blossomed. International tensions between countries and between large corporations came to the fore, with small clashes being escalated to real conflicts. Cross-national stereotypes were brought into play to explain the unwillingness of some richer nations to support their poorer counterparts.

The crisis was complex. The acute phase was 2007–8 but the aftershocks continue to date (and will continue probably long after this book is published). From the point of view of risk analysis, this crisis is horrendously complex. This is not a single hazard event. This is a systemic hazard – where one incident triggers the next, and so on. Each has its own risk profile and is open to amplification or representational processes. Yet all are happening at once or in close succession and are not independent of each other. At one level, this complexity is a perfect target for a SARF analysis. SARF would provide a framework for meticulously exploring the interactions in incidents and their representations which resulted in each stage of the crisis in the catalogue of events that unfurled. It would allow the systematic specification of the key 'stations' in attenuation or intensification, de-attenuation and de-intensification, and representation throughout the cycle of the crisis and the recession (whether double or triple dip). At another level it is a perfect target for an analysis that focuses specifically upon risk management. In exploring the reasons for the crisis, the US Senate's Levin-Coburn Report (2011) asserted that it was the result of 'high risk, complex financial products; undisclosed conflicts of interest; the failure of regulators, the credit rating agencies, and the market itself to rein in the excesses of Wall Street'. Internal risk management by banks and external risk management by regulators failed. Appropriate safety cultures may have been absent. However, the roots of the crisis are inevitably open to great debate. Anything that complex will have multiple causes, at many levels, and it is unlikely that a single explanation will emerge. Nevertheless, it seems very likely that the emphasis on failures in risk management will be retained.

The analysis of risk management shifts the focus to the causes of the crisis rather than the course of the crisis (on which SARF tends to focus). The course of the 2008 crisis and the ensuing recession are interesting from the perspective of hazard sequences, templates and negotiation.

The crisis can certainly be seen as part of a hazard sequence: ranging from prior to the nineteenth century (e.g. 1637 the bursting of the Dutch 'tulip mania'; 1720 the South Sea Bubble) through the nineteenth century (e.g. a variety of 'panics' including the Long Depression of 1873–8 in the USA and, in 1893, the US railroad fiasco that plunged banks into collapse) into the twentieth century (e.g. the 1901 crash of the New York stock exchange; the Wall Street crash of 1929 and the Great Depression; the 1973 oil crisis and stock market crash; 1987, 'Black Monday' – the largest one-day percentage decline in stock market history; 1989, the US Savings and Loans crisis; 1990, the Japanese asset price bubble; 1992–3, 'Black Wednesday' – speculative attacks on currencies in the European exchange rate mechanism; 1994–5, the Mexican debt crisis; 1997, the Asian financial crisis; 1998, the Russian financial crisis), and, finally to the twenty-first century (e.g. 2001, the Argentine crisis; 2001, the bursting of the dot com bubble; 2008–11, the Icelandic financial crisis). Each crisis had its own profile and was unique but risk representation processes accumulated a template for financial hazards based on this extensive sequence. By the time the 2008 crisis occurred, the template for its representation was ready. It is notable that it did not fit easily into the template – the media

on many occasions emphasised that this was orders of magnitude more disastrous than most every other financial calamity on record; nevertheless, their reference point in making sense of the 2008 events was the sequence that was part of that record. The dimensions of the 2008 crisis were articulated in terms of the way it deviated from things that had gone before but also in terms of the parallels with the past – particularly the failures of the past. This provided a common backdrop (a template) for communicating about the crisis. The template, even though it was itself complex, offered a way of simplifying the enormous complexity of the crisis. It provided a common frame of reference for the people and institutions that had to explain the crisis and react to it. Creating explanations and generating plans to tackle the crisis required the hazard to be negotiated. There was no simple consensus about the nature of the hazard – which was hardly surprising given its significance and international scale. The representation processes that came into play (between governments, the media, commercial organisations, financial institutions, the academic establishment and the public) were effectively negotiating the hazard. They were engaged in achieving a communal understanding that would underpin an integrated response.

To talk of hazard sequences, templates and negotiation is to add specificity to the SARF account of risk representation. However, the example of the 2008 crisis highlights the need to go further than to understand that sequencing, templates and negotiation are operating. What happened in 2007–8 shows that we need theories that will explain how sequences are chosen and interpreted, how templates are constructed and promulgated, and how negotiations lead to conclusions. The next two sections of this chapter seek to introduce two theories that may be useful in this.

7 Social representation processes

Given that SARF is not itself a theory, it may be worth considering whether theories originating elsewhere could be used to explain and predict some of the findings that it has generated. A variety of theories from social psychology could be used in this way. For instance, theories of intergroup relations (e.g. Turner and Giles, 1981) or social influence (e.g. Turner, 1991) would seem potentially valuable in providing the explanations for the way hazards are negotiated or the form that ripple effects take. However, two theories seem particularly useful in offering interpretations of the way risk events are amplified and the ripple effects that they have: Social Representations Theory and Identity Process Theory. Social Representations Theory is dealt with in this section and Identity Process Theory in the following section of the chapter.

Social Representations Theory (SRT) (Moscovici, 1988; Moscovici and Farr, 1984; Howarth, 2006), one of the major social psychological theories of social influence processes (Elcheroth et al., 2011), can provide the basis for explaining how an individual may acquire a representation (or mental model) of a hazard (Breakwell, 2014b). In this theory, social representations can be both products and

processes. As a product, a social representation is defined as a widely shared set of beliefs, a systematic framework for explaining events and evaluating them. As a process, social representation is the whole package of activity (communication, exchange and argumentation) in which individuals and groups engage to make meaningful changes in their physical and social environment. According to Moscovici, social representation operates with two prime processes:

- objectification
- anchoring.

Objectification entails translating something that is abstract into something which is almost concrete, gaining a density of meaning which ultimately makes it a common and 'natural' part of thinking about the object. Anchoring entails categorising a new object into pre-existing cognitive frameworks in order to render them familiar – reducing the strange and unfamiliar object to the level of an ordinary object set in a familiar context.

The theory of social representations may be particularly relevant to explaining why particular images or mental models of hazards evolve, because it was initially developed to explain what happens when people are faced with having to make sense of, or give meaning to, ideas or data which are novel to them, under conditions of uncertainty and where claims are contested. Plainly these are qualities that characterise the initial interface between people and information about hazards. Indeed, it might be argued that encountering a newly identified hazard inevitably triggers social representation processes. Breakwell (2001a) suggests that the novel, normally abstract, scientific specification of the hazard typically requires such objectification and anchoring. Castro and Gomes (2005) illustrated this through an analysis of the way the media discussion of GMOs (genetically modified organisms) developed in the Portuguese newspapers between 1999 and 2001. They showed anchoring in prior ideological systems concerning agriculture and scientific innovation. Moloney et al. (2005) found that the way social understandings of donation and transplantation were developed and then elicited was dependent upon existing norms in the social context.

The processes of objectification and anchoring could account for the structure, often evident, in representations or mental models of hazards held by lay members of the public. Frequently, systematic empirical investigations expose lay representations of a novel hazard that are characterised by objectification (the abstract properties of the hazard being translated into commonly understood metaphors or represented through tangible, if tangential, exemplars) and by anchoring (being given meaning through association or through claiming similarity with other types of explanation that are more familiar). SRT would suggest that the representation that is constructed of any hazard will be determined by the proclivities of the individual for particular forms of objectification and anchoring.

However, SRT would emphasise that the representation (or mental model) produced of any hazard is not idiosyncratic or purely individualised. SRT states that objectification and anchoring are not individual processes. They are processes

that normally involve social interaction and the establishment of shared meaning and consensus through communication among people. If mental models of hazards are generated through processes of social representation, they will be substantially shared by members of discrete subcultures. This idea that the mental model of a hazard is in many respects the product and property of a group or subculture should not be regarded as particularly novel. In fact, much of the research on mental models in the cognitive psychology literature on decision-making has focused upon shared mental models of complex systems and their implications for maintaining team effectiveness in the workplace (Cannon-Bowers et al., 1990; Castellan, 1993). Joffe and Lee (2004) adopted the social representations approach to the study of images that local women produced of the 2001 Hong Kong avian flu epidemic. They showed that the images of the epidemic were structured around explanations of its origins, anchors for it, emotions about it and graphic images of its effects. Aspersions concerning the lack of hygiene of mainland Chinese chicken farmers and chicken sellers in Hong Kong dominated the images. Other environmental factors were also stressed, as was regulation leniency and drive to profit. Comparisons between old traditions and newer practices formed a central feature of the representation. The study shows the significance of intergroup stereotypes and cultural expectations in the rapid and consensual development of a representation of a new hazard. In a cross-national study of the social representations of HIV/AIDS, Goodwin et al. (2003, 2004b) described significant cultural and gender differences in the structure of the representations and their relationship to sexual risk-taking. Such results have led Morgan (2009) to suggest that public health communication campaigns should include strategies to provoke interpersonal communication about the topic as a means of creating social representations that promote behaviours that support public health.

The theory does not propose that all members of the subculture would hold absolutely identical mental models of a hazard but rather that their mental model would share certain common core elements. Individuals within the subculture might then have mental models that incorporate some minor peripheral elements that are not shared. Abric (1994) has argued that social representations comprise a central core (an indispensable combination of basic underlying components linked in a specific constellation and tied systematically to a set of values and norms associated with the group espousing the social representation) and the peripheric elements (the way the representation is articulated in concrete terms depending upon context). Abric argues that the core is resistant to change but that the peripheric elements are responsive to changing context. By adapting, the peripheric elements can protect the core from having to change. Following Abric might lead one to conclude that individuals will be different from each other in the personal representations they construct, not in the core, but in the peripheric elements. Empirically, problems in differentiating core from periphery make testing this hypothesis difficult. It is, however, worth pursuing. To do so would, of course, demand an operational definition of peripheric elements which

did not depend upon the extent to which they are consensually included in the representation. Moliner and Tafani (1997) have made an interesting start in this direction by examining how far components of a social representation can be ordered in terms of an evaluative dimension. Lin et al. (2013) have actually examined differences between groups in their social representations of a single object: pain. They looked at differences between men and women in their social representations of pain by means of network analyses of data from a free evocation task that essentially asked respondents to say what they thought of when they thought about 'pain'. They said they found that females have a central core to their network structure of the social representation of pain, whereas men do not. Irrespective of the validity of this particular study, it illustrates that researchers are now pursuing the methods that will provide access to the structure of social representations and, once they think they have found them, they will use them to pursue differences between subsets of people.

SRT suggests that subcultures (and social categories and groups) shape the social representations that they develop to serve their self-interests. Thus the construction of a mental model of a hazard by a subculture will be purposeful, motivated to achieve particular objectives. There is overwhelming evidence that risk in general is fertile ground for contested social representation, and competing mental models of hazards are common. Fischer et al. (2012) provide the classic example of this in their study of representations of climate change. They used qualitative interviews, across five European countries, to explore how people conceptualised climate change within a wider context of energy use and sustainability. Their work showed that people construct multi-faceted representations, reflecting a variety of prevalent and contradictory discourses, about climate change. They emphasise that representations have cognitive, normative and affective components which can be in tension and this may mean that behaviour is not predictable on the basis of the social representation that is presented by an individual.

Moscovici (1988) notes the scope for groups to use social representations strategically and identifies three types of representation:

- *Hegemonic representations* – these are shared by all members of a highly structured group without them having been produced by the group; they are uniform and coercive. For example, the system of beliefs that characterise a 'Doomsday' cult that prophesies the end of the world might constitute such a representation.
- *Emancipated representations* – these are the outgrowth of the circulation of knowledge and ideas belonging to sub-groups that are in more or less close contact – each sub-group creates and shares its own version. These representations are freed in the sense that the sub-group is at liberty to elaborate and shape them based on the access that they have to sources of information. For a single issue, there can be a number of emancipated representations – take for example the way

different sub-groups will interpret a news report that horse meat is being passed off as beef and sold in processed foods. The social representations generated may have many dimensions and each sub-group can select or emphasise different dimensions. These social representations are not necessarily conflicting, they do not serve the interests of conflicting parties directly.

- *Polemical representations* – these are generated in the course of social conflict or controversy, and society as a whole does not share them; they are determined by antagonistic relations between its members and are intended to be mutually exclusive. The clash between climate change 'nay-sayers' and those who attribute global warming to human action might be an example.

The representation of a specific hazard could fall into any of these categories of social representation.

This SRT interpretation of the genesis of the representation of hazards has significant implications for explanations of how intensification or attenuation might work. It suggests that the subcultural base for any individual's representation of a hazard will influence their susceptibility to any reframing attempts, including official interventions aimed at changing risk perceptions. It is necessary as a precursor to any intervention to understand why the representation takes the form that it does. More specifically, it highlights that, where the representation is *hegemonic*, the intervention must take account of the fact that the representation is not a product of the subculture but is substantially shared by everyone in it. This suggests that changing the representation (or mental model) of the hazard may require the use of one of three prime alternative strategies:

- showing that the source of the original representation has recanted and changed its beliefs about the hazard
- showing that an equally powerful alternative source would support the target subculture changing its representation
- giving the target subculture (or some subset of individuals in it) the informational and motivational basis for rejecting the original representation.

Where the representation is *emancipated*, the intervention must provide a basis for changing it that emphasises the self-interest of the target subculture that has developed it and should encourage the regular communication within that subculture to rehearse and re-emphasise the changes required. Where the representation is *polemical*, the intervention must show how changing it would serve the target subculture's interests in the context of subcultural conflict. In all cases, these interventions would require more than a simple information-deficit correction approach targeted at the individual. They involve acknowledgement of the motivational and subcultural dynamics that underpin the development of the original representation.

Studies of the social representations of hazards are now growing in number (Goodwin et al., 2004a; Joffe, 2003; Canelon and Rovira, 2002; Simarra et al., 2002; de Souza, 2001; Callaghan et al., 2012).

8 Identity processes

We turn now to Identity Process Theory (IPT). Although social representations have been defined at one level as being a widely shared set of beliefs, it is not the case that beliefs are accepted and used by individuals in their entirety. Among alternative competing social representations, the hazard representations of which an individual is aware, will accept and may use will firstly depend upon the significance they have for identity. That is, the content and usage of a social representation (or mental model) can be predicted in relation to its likely impact upon the demands of individual identity requirements.

Identity Process Theory (Breakwell, 1986, 1993, 2001a, 2014a, 2014b, 2014c, 2014d) is a theory of identity – it is concerned with the holistic analysis of the *total identity* of the person. It proposes that this identity will encompass elements that are dynamically derived from every aspect of the person's experience – social category memberships, interpersonal relationships, social representational exposure, individual activity and observation, and so on. IPT struggles to find a way of articulating the complex dynamic process of personhood that incorporates the personal and the social – the active, subjective conscious self and the objectified, known self. At the core of IPT is the assertion that the person seeks to construct and maintain an identity – and that this process is orderly (in the sense that there appear to be relatively predictable states of identity that are sought). It is clearly argued that this identity comprises many elements (some derived from social category-membership; some derived from other aspects of experience within the social world). Identity is a multi-faceted, complex phenomenon. It is both a dynamic process and a dynamic state of being.

IPT offers a framework for thinking about the development of the structure of identity. It proposes that the development of identity structures has to be seen as a process occupying the person's whole lifespan. It suggests that the characteristics of the human biological organism (capacity for memory, sensory features, rate of growth, etc.) interact with the social context to provide the material for identity construction. It is argued that the neuro-cognitive capacities of the individual provide the ongoing core to identity processes. Essentially, the individual interprets experience and assimilates its implications into their identity. The relatively simple model offered by IPT originally for the identity structure was that this core would operate through the lifespan and the content and evaluation dimensions of identity would develop as the individual aged. The implication was that both content and evaluation would accumulate and be organised.

However, theory is more focused on the processes of identity than upon structure. IPT proposes that the individual's identity is a dynamic social product

of the interaction of the capacities for memory, consciousness and organised construal with the physical and societal structures and influence processes which constitute the social context. It proposes that identity resides in psychological processes but is manifested through thought, action and affect. Identity can be described in terms of both its structure and in terms of its processes. People are normally self-aware and actively monitor the status of their identity. In IPT, the structure of identity is postulated to be regulated by the dynamic processes of accommodation/assimilation and evaluation which are deemed to be universal psychological processes. Assimilation and accommodation are two components of one process. Assimilation refers to the absorption of new components into the identity structure; accommodation refers to the adjustment which occurs in the existing structure in order to find a place for new elements. The process of evaluation entails the allocation of meaning and value/affect to identity contents, new and old. The two processes interact to determine the changing content and value of identity over time; with changing patterns of assimilation requiring changes in evaluation and vice versa. These two identity processes are said to be guided in their operation by principles which define desirable states for the structure of identity. While the actual states considered desirable, and consequently the guidance principles, are possibly temporally and culturally specific, the original formulation of IPT claimed that currently in Western post-industrial cultures the three prime guidance principles discernible were desire for continuity, distinctiveness, and self-esteem. Later, a fourth guidance principle was added: efficacy. These four principles vary in their relative and absolute salience over time and across situations.

The important point for the current discussion is that IPT states that when distinctiveness, continuity, self-esteem or efficacy are at risk, the identity is threatened, and the individual will try to protect or regain them. IPT links social representation and identity models to predict risk perceptions, and proposes that the extent to which any message about the risk will be received and incorporated into belief systems is affected by the ways in which this may threaten the individual's identity (Breakwell, 2014e).

The individual's relationship to any social representation can be described along a number of dimensions:

- *Awareness* – individuals will differ in their awareness of the social representation; some individuals will simply not know that there is a social representation in existence, others will know only part of its scope, and yet others will be fully aware of its structure and content. For instance, at any one time awareness of the available social representations of pandemic influenza will differ across people. Awareness is likely to be determined, in part, by previous personal experience, which, in turn, will be controlled to some extent by membership of different groups or communities. But awareness will also be determined by the significance of the object of the representation. If the

target changes in significance due to some change of social or physical circumstances, awareness of existing social representations will alter. For example, with reports of scientific estimates of the growth of the hole in the earth's ozone layer and the consequent global warming, the significance of social representations previously generated by environmentalist activists was heightened.

- *Understanding* – individuals will differ in the extent to which they actually understand the social representations of which they are aware. There is ample evidence that individuals are capable of reproducing a dominant social representation even though they cannot explain how or why its elements fit together and, if challenged, they cannot justify it. For instance, in the late 1990s many people were aware of the social representation of the Millennium Bug (or Year Two Thousand Problem). This entailed the predicted collapse of systems dependent upon computers as midnight on 31 December 1999 chimed in the new century, because these computers were not programmed to recognise dates after that day. The social representation was interesting because it was elaborated to include what one must do to protect oneself from the effects of the collapse (e.g. avoid air journeys at that time, take out plenty of cash in advance because the banking systems would cease to function, etc.). While many people could detail these elements of the social representation, equally many could not explain why the computers would fail just because the date was wrong.
- *Acceptance* – individuals will differ in the extent to which they believe or accept a social representation even if they are fully aware of it. Typically, people can say: this is what is generally believed but, nevertheless, this is what I believe. For instance, I might know that other people believe the world is round, but I believe it is pear-shaped and the rivers run out of the stalk. Similarly, I might say that I know that the majority of people believe that microwave ovens are safe and useful, but personally I have a theory that they are dangerous and liable to fry your eyeballs because they leak waves that no one can detect. People can not only know (in the sense of being able to reproduce at will) contradictory social representations of the same target but also be able to identify at the same time a separate representation of it which is their own. This personal representation may be unique only in the specifics and may share many of the common features of the social representation, but it has been intentionally personalised. The extent to which the personal representation echoes the social representation reflects in part the degree to which the latter is accepted. The importance of being able to personalise the social representation so that it appears individualised should not be ignored. While seeking identification and community membership at one level, people also simultaneously seek distinctiveness and differentiation.

The personalising of social representations is part of that process of establishing and protecting an accepted but also a unique identity.

Assimilation – the individual does not accept (to whatever extent it is accepted) the social representation in some clinically detached way. It will be assimilated to pre-existent systems of personal representation (developed originally within the operation of idiosyncratic cognitive biases and capacities). This substratum of already extant personal representations will differ across individuals and the ultimate shape of the new personal representation will be influenced by it differentially for each individual. Just as social processes ensure that the new social representation is anchored in prior social representations, at the individual level cognitive and emotional processes ensure that it is anchored in prior personal representations. In fact, there must be an intimate connection between the social processes of anchoring and objectification and their parallel individual processes. The social communication which ensures that novel events and ideas are interpreted in terms of existing systems of meaning is generated by individuals using prior knowledge mediated through cognitive and conative networks. The social exchange can produce understandings which no single participant to the interaction might be able to create, but at some level even these emergent representations are limited in some ways by the capacities of the individuals involved to anchor and objectify.

Salience – the salience of a social representation will differ across people and for the same person across time and contexts. The salience of the social representation, for instance, may increase if the group or community which generates it is important to the individual. Similarly, it may increase if the social representation becomes relevant to the individual's ongoing activity. At the level of the community, if the target for social representation is non-salient, it is likely that the social representation will be difficult to elicit, simple, undifferentiated and relatively unconnected with other components of the community's belief system. For instance, Hassan (1986) did a study of the social representations held of female circumcision by British, rural Sudanese and urban Sudanese. She found that the British had a rudimentary social representation of female circumcision, but one which was consensually held; in the Sudan (where the practice was widespread) there were very complex social representations which attributed religious and social significance to the procedure and, importantly, there were a number of variations in the social representation, each associated with different parts of the community (urban vs. rural; male vs. female). At the level of the individual, the salience of the social representation will be likely to influence how accurately and completely personal representation mirrors it.

It is notable that some of the dimensions which shape the personal representation are potentially non-volitional (for example, awareness and understanding); others are volitional (for example, acceptance). However, this distinction may be rightly regarded as arbitrary. Even those that appear volitional are largely predisposed by prior social experiences and constrained by identity requirements.

The nature of, and scope for, individual impact upon the social representational process depends in some ways upon the type of social representation concerned and upon the structure of the social representation itself. It will vary across hegemonic, emancipated and polemical types of representation because they reflect different power relationships within and between groups or subcultures. The hegemonic representation supposes little individual variation. The emancipated representation supposes individual variation based upon differential exposure within group contexts. The polemical representation supposes individual variation based upon the prevailing conditions of intergroup conflict. Of course, it is the scope for personalising representations which emerges when emancipated or polemical representations prevail about a target that is one of the necessary conditions for innovation and change. This assertion is not meant to trivialise or ignore the real differentials between individuals in their power to maintain or to proselytise their personal representations. One of the things which this perspective emphasises is that personal representations will be perpetually under pressure to change from the social representations which surround them. Individuals who are powerful (through position, expertise or some other route) are more likely to be able to retain their own personal representations and to be able to influence the development of social representations shared by others.

IPT (Breakwell, 1993) argues that identity requirements are important determinants of awareness, understanding, acceptance, assimilation and salience of social representations (and, by extension, of mental models of hazards). IPT postulates that individuals are motivated to achieve certain characteristics in their identity structure: continuity, distinctiveness, self-efficacy and self-esteem. These four motives vary in their relative and absolute salience over time and across situations. A threat to identity occurs when these motives cannot be satisfied. If they find that esteem, continuity, distinctiveness or efficacy is threatened, individuals will use a variety of strategies to protect or regain them. IPT has now generated an extensive series of studies which illustrate that individuals in the same social category will accept and use (i.e. reproduce or act in accordance with) a particular social representation to differing degrees depending upon its potential impact upon their identity esteem, continuity, distinctiveness and efficacy.

Many of these studies have concerned social representations of hazards. For example, Joffe and Bettega (2003) explored the social representations of AIDS among Zambian adolescents. They found that the structure of the social representation of the danger of AIDS served to protect the identity of the participants but also to justify current social practices. Similarly, individuals will reject social representations of their local environment as being polluted (despite objective evidence that it is) if attachment to that place features as an important aspect of

their personal sense of distinctiveness (Bonauito et al., 1996). This study involved estimates of risk in relation to the levels of beach pollution (locally and nationally) in six English coastal resorts. The entire sample lived in towns where beaches had been officially declared either clean or polluted by the European Union. If beaches are declared clean by the European Union, they are given what is called a blue flag. Having this accolade has a significant impact on the marketability of the town for tourism. The sample was asked to indicate how far they were attached to their locality (place identification), and their nationalist sentiments were also assessed. They were further asked to index the extent of the pollution of which they were aware on their local beaches. Finally, they were asked to rate the level of beach pollution locally and the level of beach pollution nationally. Essentially, the data showed that, over and above the impact of the rating of pollution that was given by the European Union, local attachment to the place and nationalism predicted representations of the extent of pollution locally and nationally. The requirements of place identity are associated with a rejection of the representation of the risk of pollution in the area that is generated formally by European Union legislation. Given the generally negative feelings of the British people towards the European Union, it should hardly be surprising that nationalism was associated with a rejection of the European Union's evaluation of the British environment. More surprisingly, both attachment to the locale and nationalism were associated with a reduction in the perceived 'objective evidence' of beach pollutants, and both had a direct impact upon the perceived level of local beach pollution. This study illustrated that processes of identification limit willingness to accept social representations of hazards (in fact, it seems they affect the mental model of the hazard). It suggests that they tend to construct personal representations that are consonant with the identity requirements – in this case, those aspects of identity dependent upon affiliation to place.

Such studies would suggest that polemical social representations of hazards are most significantly mediated by identity processes. Many environmental hazards generate polemical social representations of hazards, created by agencies or groups in conflict. Under these circumstances the social representations of hazards that the individual chooses will be highly influenced by identity requirements. An example comes from a study of how a community responded to a potentially hazardous waste incinerator being sited locally (Twigger-Ross and Breakwell, 1999). The company wishing to introduce the development wanted to do so in an area that was already highly industrialised and where they had a well-established chemical processing complex. The introduction of this new waste incinerator was opposed by various environmental groups, including Greenpeace and Friends of the Earth. This community was studied throughout the lengthy process of gaining legal planning consent for the new incinerator. In a survey of local residents, indices were taken of the extent to which individuals perceived that there would be a risk arising from the development of the new waste incinerator, their trust in the governmental regulation of such risks, the image they held of the company, and their concern for the environment and their acceptance of 'Green' beliefs.

Residents varied in their representation of the hazard and its risk. The representation that they reproduced depended upon the extent to which they identified with environmentalist groups, but also upon the extent to which they identified with the company as a trusted and traditional employer in the area. In a more recent study, Masuda and Garvin (2006) similarly analysed the significance of pre-existing patterns of social representation (what they called cultural world-views) in determining how the risks surrounding industrial development were viewed in a region of Canada located at the rural–urban interface. They concluded that patterns of risk intensification and attenuation were based on conflicting cultural world-views.

Essentially, in both of these studies, individuals were found to reject social representations that might threaten important aspects of their identity. However, it is probably too simplistic to use the term 'rejection' when examining how identity constraints motivate the way a social representation is treated. What often happens is that the social representation is subtly modified in personal use. For instance, it can be slightly re-anchored or there is a minor tweak to the objectification (often through use of different exemplars). Yet, in effect, individuals who are actively engaged in identity maintenance and development are also perforce engaged in social representation creation and change. Of course, whether or not their renovation of the social representation gains common acceptance or use is a function of the processes outlined in the theory of social representations itself. The significant point that all these studies have shown is that there is never total consensus upon a social representation. All the research illustrates variety among individuals despite elements of agreement and consensus. Empirical studies emphasise divergence amidst universalism. Moreover, the divergence is not random. It is lawful and, in part, predictable in terms of IPT expectations concerning the desire to achieve and maintain esteem, efficacy, distinctiveness and continuity for identity.

The recognition that identity processes moderate, at the level of the individual, the structure of the personal representation (or mental model) of the hazard has implications for risk communication interventions. It suggests that the role of the specific representation of the hazard in maintaining the individual's self-esteem, efficacy, continuity and distinctiveness should be identified. Methods for presenting an alternative representation of the hazard should avoid threatening self-esteem, efficacy, continuity and distinctiveness as far as possible. In designing a risk communication intervention, there should always be a phase which considers likely identity implications for the targets, and estimates the possible barriers to achieving change that may be involved. This sort of assessment may provide a basis for focusing effort upon targets who are most likely to change or upon those who require greater attention. It will almost certainly suggest how information could be best presented and allow avoidance of the most obvious pitfalls (see Breakwell, 2001a).

This approach to risk communication is particularly relevant in the context of current societal concerns to access those members of the community who are typically unresponsive to general media campaigns (e.g. the elderly, those with

disabilities, ethnic minorities, those with learning difficulties). This approach argues for a more differentiated approach to risk communication that takes systematic account of the personal and subcultural concerns of the target audience.

The implications of this approach for risk communication in the workplace are also important. Recognising that mental models of hazards will be substantially a product of subcultural dynamics that are modified by individual identity motivations suggests that interventions in the workplace must be founded upon a clear appreciation of the group or team's shared representations of the hazard. However, the significance of the informal influence networks and the implicit reinforcers for the original representation of the hazard cannot be minimised. In fact, the social representation and identity process approach provides a framework within which such resistances to change in the mental model of the hazard can be analysed. It particularly points to the need to pay attention to the subcultural advantages of the existing mental model of the hazard when devising any intervention.

Conclusion

The SARF provides a useful platform for the systematic analysis of the consequences of a risk event. The research it has stimulated has been particularly influential in allowing us to understand stigmatisation and, increasingly, the role of the mass media in promulgating hazard representations. The SARF is a comprehensive approach to the analysis of the risk event. It pushes researchers towards a whole life-cycle examination of the hazard, recognising that it exists as part of hazard sequences. It makes it clear that the impacts of a risk event cannot be meaningfully said to lie at any one level of analysis. As a consequence, it is requiring the use of multi-disciplinary methodological tools. The layering method, described here, represents one systematic approach to direct data collection that is appropriate to the SARF.

As more empirical work is done, the absence within the SARF of a predictive model has become more concerning. Patterns in the processes of amplification and rippling that the research reveals are calling for explanation and interpretation. This inevitably encourages ad hoc and post hoc theorising. The two theories presented in this chapter (SRT and IPT) would seem together to offer a meta-theoretical structure that could be used by SARF researchers. These theories are targeted precisely at the factors that should determine the nature of amplification (including intensification, attenuation, representation, de-attenuation and de-intensification) and rippling processes. Used in conjunction, IPT and SRT range across the spectrum of intra-personal, group and intergroup processes that affect the development of the representation of the hazard and its subsequent secondary impacts. These theories will generate hypotheses that are testable within the SARF. It is, however, vital to recognise that these are essentially theories at the social psychological level of analysis. In order to generate robust hypotheses, the SARF demands that the relevance of theories from other levels

of analysis (e.g. the economic) should be incorporated. It would be fascinating to see a worked example, using the aftermath of a single risk event, which attempted to show how these social psychological models could be used in conjunction with economic models (or, indeed, models at other levels of analysis) to predict the course of events. The layering method would provide the relevant data. The challenge lies in achieving the conceptual integration of theories. Such an approach might mean that it is possible to explain not only how representations of a hazard evolve over time, but also how representation is related to behaviour not just at the individual but also at the organisational and community levels. An explicit model of the relationships between representations, decision-making and action is long overdue.